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The Role of Country-of-origin Characteristics for Foreign Direct Investment and Technical Cooperation in Post-reform India*

Axel Dreher, Peter Nunnenkamp and Krishna Chaitanya Vadlamannati

Abstract:
The decisions of foreign investors on technical cooperation versus equity engagements and on the degree of ownership in FDI projects are likely to depend on their relative bargaining position vis-à-vis the host country. India provides an interesting case for analyzing the interplay between country-of-origin characteristics and host-country characteristics and their respective effects on ownership decisions since opening up its economy to FDI in the early 1990s. We perform negative binominal regressions by making use of a unique dataset on about 24,500 technical cooperation and FDI projects by investors from 45 countries of origin over the 1991-2004 period. We find that relative market size, relative financial market development, relative risk, relative endowment of human capital and previous international experience significantly affect the type of engagement by foreign investors in post-reform India.

Keywords: foreign investors, countries of origin, joint ventures, technical cooperation, India.

JEL classification: F23; L24

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Introduction

India hosted a stock of US$ 164 billion in foreign direct investment (FDI) at the end of 2009, compared to less than US$ 2 billion prior to the major reform program in 1991 (UNCTAD 2010a). The country has become one of the most attractive locations among developing economies for multinational corporations from various countries of origin. The opening up of its economy to world markets is widely credited as a major pull factor of booming FDI (e.g., Balasubramanyam and Mahambare 2003). Push factors have received only scant attention. This is surprising as country-of-origin characteristics are likely to have an important say on the type and form in which multinational corporations engage in India. The decisions of foreign investors on financial engagements versus purely technical cooperation, as well as the degree of ownership in FDI projects, in turn, may affect the macroeconomic benefits of host countries such as India.

India provides an interesting case for analyzing the interplay between country-of-origin characteristics and host-country characteristics and their effects on ownership decisions by foreign investors. The bargaining position of the latter depends on their technical, managerial and financial capabilities acquired at home. Companies based in economies at the technological frontier may insist on full ownership control, for example, to prevent leakage and protect intellectual property. India is particularly interested in gaining access to superior technologies, and has therefore increasingly relaxed FDI-related regulations that had traditionally constrained ownership choices for foreign companies (Singh 2005; Kumar 2006). Yet the process of opening up may also have strengthened India's bargaining position, for instance by offering more dynamic local markets.

We make use of a unique dataset on about 24,500 approved cases of technical cooperation and FDI during the 1991-2004 period in order to assess the impact of country-of-origin and host-country characteristics on the number of projects involving companies based in 45 countries of origin. The dataset allows us to distinguish between purely technical cooperation (without any foreign equity engagement) and FDI with different degrees of foreign ownership. Performing negative binominal regressions, we find that relative market size, relative financial market development, relative risk, relative endowment of human capital and previous international experience significantly affect the type of engagement by foreign investors in post-reform India.

2. Analytical background

Similar to most empirical studies on the determinants of FDI in developing host countries, the recent literature on the driving forces of the FDI boom in India almost exclusively focuses on pull factors in the host country. For instance, Sury (2008) employs an OLS regression analysis on quarterly data over the 1991-2003 period and finds that FDI flows to India are determined by

national income, the tax rate, openness to trade and labor costs. Choi (2007) derives similar results through vector error correction estimations, using annual data dating back to the 1970s. Joshi and Dadibhavi (2008) consider various location factors to construct an investment climate index for 19 Indian states; the correlation between this index and approved FDI at the state level during the post-reform era turns out to be high and positive. Palit and Nawani (2007) stress the role of local technological capabilities and supporting infrastructure as increasingly important for host countries such as India to lure multinational corporations.

All these studies assume, at least implicitly, that the host-country characteristics considered are equally important for all foreign investors and for the different types of FDI, ranging from joint ventures (JVs) with minor foreign equity stakes to wholly foreign-owned subsidiaries. This assumption is unlikely to hold. For instance, political and economic risk in the host country, as well as the reliability of its institutions, should matter more for foreign investors from home countries where entrepreneurs tend to be risk adverse. Pan (1994) argues that in the Chinese context, risk adverse Japanese investors are less likely than US investors to undertake FDI with potentially high sunk costs and to enter into minority owned JVs with local partners. More generally, Pauly and Reich (1997: 22) stress "remarkably enduring divergence" in the behavior of multinational corporations based in major OECD countries. Stylized facts presented by these authors point to "stark national differences" in the willingness to transfer new technology to host countries of FDI and to integrate foreign subsidiaries into intra-firm trade. Likewise, Harzing and Sorge (2003) conclude from survey results for 287 subsidiaries of 104 parent companies based in nine OECD countries, that the strategies of multinational corporations are largely explained by their country of origin.

This suggests that analyses of the determinants of FDI should address the interplay between pull and push factors. The decision to engage in technical cooperation or FDI with varying degrees of foreign ownership can be regarded as the result of bargaining between the host country and foreign investors (Svejnar and Smith 1984). Host countries such as India tend to be particularly interested in attracting technologically sophisticated FDI projects in order to maximize spillover and growth effects. Host-country governments may also restrict foreign ownership and insist on JVs with local partners, thereby enabling the host country to appropriate a larger share of FDI-related rents (Asiedu and Esfahani 2001).[1] In contrast, risk adverse foreign investors originating from leading industrialized countries may be unwilling to transfer state-of-the-art technology unless they have full control and can prevent leakage (Desai et al. 2004).

[1] Indeed, Javorcik and Spatareanu (2008) find stronger spillovers from partially-owned affiliates of multinational corporations.

The notion of bargaining between specific foreign investors and authorities of the host country implies that push factors of FDI would optimally relate to firm characteristics. Firm characteristics that strengthen the bargaining position of the foreign investor vis-à-vis the host country include superior technological and managerial knowledge, access to capital, the size of operations, and international experience. Asiedu and Esfahani (2001) hypothesize that such characteristics are associated with higher foreign equity shares in FDI projects. However, the measurement of "ownership specific advantages" (Dunning 1979) at the firm level typically suffers from serious data constraints. For example, the database we use below offers detailed information on technical cooperation and FDI projects in India (see Section 3 for details), while firm-specific information is lacking on the foreign parent company that is involved in a particular project. Hence, we follow Dunning (1979) who argues that firm-specific ownership advantages can be related to characteristics of the country of origin where the firm is based. In particular, the economic and technological development of the country of origin is supposed to "generate and sustain" (Dunning 1979: 280) the advantages that specific foreign investors might have when bargaining over technical cooperation or FDI with the host country.

Some previous studies have applied a similar approach by focusing on the impact of country-of-origin characteristics on FDI decisions. Characteristics that have received the most attention include: GDP per capita as a general measure of economic development, GDP as an indicator of size and economic diversity, political and economic risk factors, wage costs and the cost of borrowing, distance as a proxy of transaction costs, export and import intensity to reflect international experience, and exchange-rate developments.[2] As shown in Section 3, we consider a similar set of country-of-origin characteristics in the present analysis. In contrast to most previous studies however, we assess the impact of these characteristics on different types of technical cooperation and FDI projects, rather than overall FDI activity. Furthermore, we also account for changing local conditions in the host country. This appears to be particularly important in the case of India, where the business environment was affected by major economic reforms in the early 1990s.

In summary, we capture shifts in the relative bargaining position of foreign investors vis-à-vis the host country India. Shifts in the relative bargaining power in favor of foreign investors from a particular country of origin would imply that the share of FDI-related profits to be appropriated by the host country declines (Svejnar and Smith 1984). As a result, FDI from this source should become more likely; it should also become more likely that FDI takes the form preferred by the multinational corporation, rather than the host country.

[2] Most of the earlier empirical literature focuses on FDI in China. For details, see the overview in Appendix D.

3. Data and method

Project-related data on FDI and technical cooperation

Our dependent variable is the number of technical cooperation and FDI projects in India undertaken by foreign investors from a particular country of origin in a specific year. We draw on a unique dataset on about 24,500 cases of technical cooperation and FDI approved during the 1991-2004 period. These count data are published in aggregate form by the Ministry of Commerce and Industry (Government of India, various issues). The case-specific information was kindly made available by the Department of Industrial Promotion and Policy (DIPP) of the Ministry of Commerce and Industry.[3]

The country of origin is clearly identified in the database for almost all technical cooperation and FDI projects. The subsequent analysis covers the projects from 45 countries of origin listed in Appendix A. We excluded various countries of origin for which data on the explanatory variables (see below) are lacking. Typically, the excluded countries have undertaken very few projects in India throughout the period of observation.[4] We also excluded financial centers such as Bermuda and, more importantly, Mauritius. As noted by Kumar (2006: 460), FDI has often been channeled through Mauritius in order to take advantage of the double taxation agreement between Mauritius and India. The database includes projects undertaken by non-resident Indians; these were also excluded as they cannot be related to country-of-origin characteristics. The sample of 45 countries of origin accounted for almost 90 percent of all projects listed in the database.

The projects included in the database cover technical cooperation agreements (without any equity stakes of the foreign partner) as well as FDI. Furthermore, the database provides information on the foreign equity share in FDI projects. This allows us to distinguish between four types of projects: (i) purely technical cooperation, (ii) minority JVs with a foreign equity share of less than 50 percent, (ii) majority JVs with a foreign equity share of 50-90 percent, and (iv) subsidiaries with foreign equity shares above 90 percent. As discussed in Section 2 above, we expect foreign investors based in economically and technologically advanced countries to prefer FDI projects with higher equity shares in order to maintain better control over their intangible assets and derive a higher share of project-related profits. In contrast, India traditionally preferred technical cooperation agreements and restricted foreign ownership in FDI projects. Foreign ownership restrictions have been relaxed during the reform process since the early 1990s, however.

[3] The data are described in more detail in Nunnenkamp and Stracke (2008).

[4] The most important countries of origin that had to be excluded because of missing data are Hong Kong (about 350 projects), Taiwan (150), and Russia (110).

Görg et al. (2010) have shown that in the case of German FDI in India, the liberalization of FDI has had two effects: On the one hand, the overall number of FDI projects increased. On the other hand, the share of projects corresponding to India's preference declined. The much broader database underlying the subsequent analysis offers additional insights. As can be seen in Figure 1, technical cooperation projects accounted for more than half of all projects in the first half of the 1990s, when wholly-owned foreign subsidiaries were clearly exceptional. Technical cooperation played a minor role at the end of our period of observation, while wholly-owned subsidiaries gained tremendously in importance. More ambiguous developments are observed for (minority and majority) JVs.

At the same time, there is considerable variation in the relative importance of the four types of projects between countries of origin. For instance, Table 1 reveals that the share of wholly-owned subsidiaries in all projects by US investors was almost four times the corresponding share for Japanese investors. The distribution of German projects across the types of projects is similar to the Japanese pattern, while the distribution of UK projects is closer to the US pattern.

Estimation approach

We estimate fixed effects panel regressions for non-negative count data. As our count data on projects are strongly skewed to the right (with an accumulation of observations at zero) and display significant overdispersion (with the variance being greater than the mean), we estimate our regressions employing the Negative Binomial estimator. Standard errors are clustered at the country level.

We estimate the following relationship:

$$\#\,projects_{i,t} = F(RB_{i,t}, COC_{i,t}, \lambda_t), \qquad (1)$$

where $\#projects_{i,t}$ represents the number of approved (technical cooperation and FDI) projects by country of origin i in year t; $RB_{i,t}$ comprises variables capturing the relative bargaining position of investors from country of origin i, relative to the host country India; $COC_{i,t}$ denotes some additional country-of-origin characteristics, and λ_t are time fixed effects.[5]

We run pooled regressions for the four types of projects, rather than performing regressions for each individual type and comparing the individual results with each other. Pooling projects increases our flexibility to statistically test for differences and similarities among the various types. Note, however, that we introduce dummies for each individual type of project below. We then interact these dummies with our explanatory variables, mirroring individual regressions for each type of project.

[5] Note that we do not include fixed country effects given that they take away most variation in the variables of interest.

Explanatory variables

Several variables relate to the bargaining framework discussed in Section 2. Relative schooling is supposed to capture the ownership advantages that foreign investors from technologically and economically advanced countries may have over local firms in India. Average years of schooling in the country of origin, relative to India, reflect skill-differences. Foreign investors based in countries with a better endowment of human capital are, in turn, more likely to have command over superior technologies that the host country would like to attract. Yet, higher skill-differences do not necessarily improve the bargaining position of foreign investors vis-à-vis India. They may also reflect differences in labor costs, especially as the data situation does not allow us to control for wage levels in the countries of origin and in India. Consequently, the bargaining position of foreign investors from high-wage countries may tend to be weakened in the case of FDI projects that are mainly motivated by low wages in India.

Market size is one of the most traditional determinants of FDI (e.g., Scaperlanda and Mauer 1969). From a bargaining perspective, the ratio of the country-of-origin's GDP over India's GDP matters in two respects.[6] On the one hand, the numerator of this ratio is supposed to reflect the potential for economies of scale, and the availability of diversified inputs in the country of origin that tend to enhance the foreign investors' productivity, and thus their bargaining position. On the other hand, the denominator reflects India's attractiveness in terms of local markets that foreign investors would like to access.

The financing of technical cooperation and FDI projects is easier and less costly for foreign investors if financial markets are well developed in the country of origin. Easier access to financing and lower financing costs are traditionally perceived to be a major source of competitive advantage for firms (Aliber 1970; Grosse and Trevino 1996). Financial market development is proxied by the amount of domestic credit as a percentage of GDP.[7] This variable is also defined relative to financial market development in India. The reason for this is that India may have better chances to involve local partners in technical cooperation agreements and JVs if the financial constraints of Indian firms become less binding.

The financing of FDI projects also depends on exchange-rate developments. The bargaining position of investors can be expected to improve if they are based in countries with a strong currency. An appreciation of the country of origin's currency, relative to the Indian Rupee, renders it cheaper for foreign investors to acquire assets in India (Froot and Stein 1991). This wealth effect

[6] Population was used as an alternative measure (see Section 4).

[7] Alternatively, we used the (real) interest rate in the country of origin, relative to the (real) interest rate in India, as a measure of the relative cost of borrowing.

is therefore likely to result in projects with higher foreign equity shares. However, recent research points to more complex theoretical links and considerable empirical ambiguity. Pain and van Welsum (2003: 826) argue that the response of foreign investors to exchange-rate movements "depend[s] on the configuration of the activities undertaken in the different locations."[8] Blonigen (1997) stresses that various types of FDI are likely to respond differently to exchange-rate fluctuations.[9] Empirically, several recent studies have found that a weaker US dollar or a stronger host-country currency were associated with *more* outward FDI by the United States.[10] Busse et al. (2010) identify different reactions of FDI to exchange-rate developments in developed and developing host countries, possibly because large and sudden exchange-rate swings are more common in developing countries. Large swings may add to exchange-rate uncertainty. Greater uncertainty, in turn, renders the option more attractive for investors to wait, so that exchange-rate effects on current FDI are increasingly blurred (Campa 1993). In order to capture exchange-rate effects, we construct bilateral real exchange-rate indexes with Indian Rupees per unit of the country-of-origin's currency set equal to one for the year 1990.

Host-country risk is well known for influencing decisions foreign investors take on where to invest (Kobrin 1980). The impact becomes more complex when defining risk in relative terms, i.e., considering the country of origin's political risk rating relative to India's political risk rating. Arguably, investors from countries of origin characterized by higher risk may be more inclined to invest abroad in order to escape risk at home. The empirical evidence is inconclusive here however.[11] Furthermore, it is open to question how relative risk conditions affect the preferences for different types of (technical cooperation and FDI) projects. One could suspect that the host country's bargaining position improves when foreign investors have stronger incentives to escape risk at home; this might imply that higher risk in the country of origin shifts the composition of projects towards technical cooperation and minority JVs. On the other hand, the foreign investors themselves may prefer projects with lower equity stakes in order to limit potential sunk costs under conditions of higher risk in the host country.

Similar ambiguity prevails with regard to more specific risk factors which are typically addressed in bilateral investment treaties (BITs), including the risk of expropriation without adequate compensation. The bargaining position of foreign investors tends to improve due to the

[8] For instance, an appreciation of the host country's currency may result in higher FDI by foreign investors "who plan to produce and sell output in that location and use imported intermediate inputs from their home country" (ibid). The earlier contribution of Cushman (1985) reveals complex interactions between exchange-rate developments, trade links, and the financing options the foreign investor may have.

[9] According to Deichmann (2004), local market-oriented FDI generally prefers host countries with strong currencies.

[10] Examples include: Görg and Wakelin (2002); Egger et al. (2005); and Schmidt and Broll (2009).

[11] Tallman (1988) finds that firms operating in a high-risk environment at home tend to invest more abroad. In contrast, Brito and Mello Sampayo (2005) dismiss the notion of FDI as a risk-diversification tool.

lower risk that comes with the ratification of a BIT by the host country with a particular country of origin. Nevertheless, the composition of projects may not necessarily shift towards majority JVs and wholly-owned subsidiaries.[12] Foreign investors may be more inclined to enter into minority JVs once a BIT is in force; this may happen, for example, if the BIT provides effective dispute settlement mechanisms, thereby mitigating potential conflicts with local partners and discriminatory treatment by host-country authorities. Our BIT dummy is coded as 1 from the year in which it was ratified, and as 0 otherwise.[13]

We consider two additional country-of-origin characteristics in the estimations. First, the stock of outward FDI held in all host countries as a percentage of the country of origin's GDP, is included in order to account for the country of origin's international experience. At the firm level, international experience helps foreign investors to adapt to local conditions and monitor overseas operations, thus being less likely to rely on local partners (e.g., Anderson and Gatignon 1988). We conjecture that similar reasoning will hold for foreign investors based in countries of origin with more international experience. Second, we add the country of origin's (logged) per-capita income in constant prices as a general proxy of the level of productivity and technological development.[14] Finally, we include time fixed effects. Time fixed effects are required primarily to account for the process of FDI liberalization in India, starting with the reform program in 1991. Summary statistics are presented in Appendix B, and detailed definitions and sources in Appendix C.

4. Results

Marginal effects on separate types of projects

Table 2 reports two specifications for each type of project – technical cooperation, minority JVs, majority JVs, and wholly-owned subsidiaries: The basic specification is shown in columns (1), (3), (5) and (7), while the extended specification, including the country of origin's per-capita GDP, is shown in columns (2), (4), (6) and (8). In addition to the explanatory variables introduced before, we include dummy variables for each of the three types of FDI projects in order to account for the relative differences in frequency compared to technical cooperation projects, which represent the base category. We also allow the slope of the explanatory variables to vary across the types of projects. Specifically, we interact each explanatory variable with the dummy variables for minority

[12] It is even argued that BITs result in more FDI, independent of its type; see Tobin and Rose-Ackerman (2011) for a recent analysis and Sauvant and Sachs (2009) for a collection of related articles.

[13] Alternatively, we considered double taxation treaties (DTTs).

[14] We also experimented with more specific indicators that reflect the country of origin's level of technological development. However, there are insufficient data with regard to measures such as spending on R&D (in percent of GDP), the number of scientific and technical publications (per head of the population), and the share of high-technology exports. For instance, the data on R&D spending are completely missing for 12 sample countries and there are major data gaps for various other sample countries.

JVs, majority JVs and wholly-owned subsidiaries. By doing this we can test for significant differences in the reaction of the three types of FDI projects, compared to the reaction of technical cooperation projects, to changes in country-of-origin characteristics and the relative bargaining position of foreign investors vis-à-vis the host country India (see next sub-section).

Estimating an interaction term in a non-linear model – such as the negative binomial regression estimation used here – is not straightforward however. The coefficient does not correctly reflect the marginal effect (Ai and Norton 2003; Greene 2010). Moreover, a simple t-test on the coefficient of the interaction term is not appropriate to test for the significance of the interaction. Rather than showing the coefficients of the explanatory variables, Table 2 therefore shows the marginal effects of each explanatory variable and the corresponding t-statistic (in parentheses), evaluated at the mean of the explanatory variables. We follow Greene (2010) and conduct a likelihood-ratio test to examine whether the fit of our model improves when including the interaction terms. Indeed, the test suggests that it does (Prob>chi2 = 0.0000).

As can be seen from Table 2, most of our explanatory variables prove to be statistically significant at the ten percent level at least, with the expected sign. This applies to all four types of projects. We formally test whether the corresponding marginal effect differs significantly from the base category of technical cooperation by performing a Wald test, showing the p-values in square brackets. We return to these differences later. Turning to the specific results, the international experience of investors, reflected in higher outward FDI stocks in all host countries as a percentage of the country of origin's GDP, is associated with a larger number of all four types of projects, at the one percent level of significance. The results suggest that an increase in *FDI outward stock/GDP* by ten percentage points would add about just 0.1 additional technical cooperation agreements, however, compared to 0.2-0.8 FDI projects (depending on the type of FDI). Foreign investors from larger (*Relative GDP*) and richer (*Per capita GDP*) countries of origin engage in a larger number of all types of projects, again at the one percent level of significance. For instance, an increase in relative GDP by 10 percentage points increases the number of projects by about 0.01-0.04. In the basic specification, the same holds for investors based in countries with a better endowment of human capital. An increase in *Relative Schooling* by 10 percentage points leads to an increase in the number of projects by between 0.01 and 0.13. The fact that the impact of *Relative Schooling* weakens in the extended specification, or even loses statistical significance at conventional levels, can be attributed to the high correlation of this variable with the country of origin's GDP per capita (rho=0.64).

More surprisingly perhaps, two more variables prove to be significantly positive at the one percent level in all estimations shown in Table 2, namely financial market development (as

reflected in *Relative Domestic Credit*) and the existence of a bilateral investment treaty (BIT) ratified by India and the particular country of origin. For *Relative Domestic Credit*, an increase by ten percentage points increases the number of projects by between 0.01-0.07. The existence of a BIT increases the number of TC projects by 0.6-0.7, and the other projects by between 1-2.7. The effectiveness of BITs in raising the number of all types of projects is in contrast with the widespread skepticism expressed in several empirical investigations on the impact of BITs on FDI flows (Sauvant and Sachs 2009). The relevance of financial market development was to be expected for FDI projects, though not necessarily for technical cooperation, which does not involve any foreign equity participation.

The effect of country risk on the number of projects is more ambiguous. Note that higher values for *Relative Political Risk* correspond to lower risk in the country of origin relative to India. A negative coefficient for this variable is thus consistent with the view that higher risk in India discourages foreign investors, while India may attract more projects from countries of origin where investors are concerned about domestic risk. This effect proves to be significant at the one percent level for wholly-owned subsidiaries. The significance weakens when running the estimations for the other types of projects, with the coefficients actually losing their significance in the basic specifications.[15]

Technical cooperation stands out as exchange-rate effects do not appear to have an impact on the number of agreements. This is plausible insofar as the wealth effect of an appreciated currency in the country of origin is not particularly relevant for projects in which the foreign firm does not acquire assets in the host country. However, the coefficients on the index of real exchange rates are significantly negative for all three types of FDI projects. This is in conflict with the traditional view, according to which host countries with weaker currencies should attract more FDI from countries of origin with stronger currencies. Our finding is more in line with the pattern observed recently for outward FDI by the United States (Görg and Wakelin 2002; Schmidt and Broll 2009) and inward FDI in developing countries (Busse et al. 2010). The large and sudden depreciation of the Indian Rupee in 1991 may have created considerable uncertainty among foreign investors about future exchange-rate developments. As discussed in Section 2 uncertainty could have prompted wait-and-see attitudes, thus causing a reduction in FDI projects as an immediate reaction to the weaker Rupee.

Finally, the time dummies included in all estimations reported in Table 2 point to changes in the composition of projects that are in line with the increasing liberalization of FDI in India post-1991, notably the relaxation of foreign ownership restrictions. Specifically, the time dummies enter

[15] Quantitatively, an increase by ten percentage points decreases the number of projects by between 0.02-0.25.

with particularly strong and significantly positive effects for technical cooperation in those earlier years when foreign investors were offered fewer equity-based alternatives. This is in sharp contrast to the negative time dummies at the beginning of the period of observation in the estimations for wholly-owned subsidiaries.

Differences between technical cooperation and FDI

In the next step, we compare the four types of projects by formally testing for differences with a Wald test. We show the p-values which indicate whether the corresponding marginal effect differs significantly from the base category of technical cooperation in square brackets in Table 2. The p-values reveal that the impact of two variables – *Real Exchange Rate Index* and *FDI outward stock/ GDP* – is stronger for all types of FDI projects when compared to technical cooperation. The finding for the exchange-rate variable accentuates the point made above regarding the option value of waiting under conditions of exchange-rate uncertainty. The option of waiting is clearly more appealing in the case of FDI projects. At the same time, foreign investors with more international experience are more likely to engage in FDI projects than in technical cooperation. On the one hand, experience seems to encourage investors to incur higher sunk costs in the case of wholly-owned subsidiaries. On the other hand, experienced investors may be better prepared for cooperating with local partners in JVs.

As for the remaining variables, several hypotheses derived from the bargaining framework in Section 2 are strongly supported when comparing wholly-owned subsidiaries with technical cooperation. In particular, the impact of the size of countries of origin (*Relative GDP*), their economic development (*Per capita GDP*), and their financial market sophistication (*Relative Domestic Credit*) on the number of wholly-owned subsidiaries, is clearly more pronounced than the impact of these characteristics on the number of technical cooperation agreements.[16] This suggests that foreign investors based in such countries are in a better bargaining position to make Indian authorities agree to wholly-owned subsidiaries. The picture is less clear for the country of origin's relative endowment of human capital (*Relative Schooling*). The impact of this characteristic on wholly-owned subsidiaries is significantly stronger at the five percent level in the basic

[16] In an unreported robustness test, we measured the size of countries by relative population (instead of *Relative GDP*) and replaced *Relative Domestic Credit* with real interest rates as a proxy for the cost of borrowing in the country of origin (relative to India). The population variable resembled the GDP variable in that (i) the number of all types of projects was affected significantly positively at the one percent level, and (ii) the pattern of the p-values was essentially the same. In contrast, our proxy for the cost of borrowing proved to be insignificant at conventional levels in almost all estimations, and the p-values did not reveal any significant differences across the four types of projects. This may be partly because of incomplete data on real interest rates for the sample of countries of origin. More importantly, it appears that negative (annual) real interest rates in several countries of origin are often the result of macroeconomic instability, rather than reflecting more persistent advantages of foreign investors with respect to the costs of borrowing.

specification in column (7), but no longer in the extended specification in column (8). This ambiguity might arise because technical cooperation often draws on qualified local labor. In other words, the Indian licensees may rely on sufficiently qualified labor to a similar extent as do the foreign owners of subsidiaries in India.

Risk factors have a significantly stronger effect on the number of wholly-owned subsidiaries than on the number of technical cooperation agreements. The stronger negative effect of *Relative Political Risk* implies a shift away from wholly-owned subsidiaries with lower risk in the country of origin and, respectively, higher risk in India. This conflicts with the proposition that Indian authorities may have a better opportunity to attract their preferred types of projects when investors have a stronger incentive to escape risk at home. It appears instead that foreign investors avoid wholly-owned subsidiaries projects because of the potentially large sunk costs under conditions of higher risk in India. At the same time, investor protection through BITs encourages wholly-owned subsidiaries more strongly than technical cooperation. This is reasonable as the protection against expropriation and insufficient compensation, typically granted in BITs, should be more relevant for foreign investors who own fixed assets in India.[17]

International experience and BITs also have a stronger impact on JVs than on technical cooperation.[18] In other respects, the evidence is less clear when comparing JVs with technical cooperation. On the one hand, various p-values reported in columns (5) and (6) of Table 2 do not point to a significantly different impact on majority JVs compared to technical cooperation. On the other hand, the p-values reported in columns (3) and (4) suggest that the differences between minority JVs and technical cooperation are similar to the differences between wholly-owned subsidiaries and technical cooperation.[19] Before returning to this surprising pattern in more detail in the next sub-section, we perform the previous estimations separately for all (technical cooperation and FDI) projects in the manufacturing sector and all projects in the services sector.

Separating projects in manufacturing from those in services may offer additional insights into whether the underlying motivation of foreign investors tends to differ across sectors. Cost motives leading to vertical FDI projects are generally more likely in manufacturing industries than in (non-tradable) services industries, where local-market-oriented horizontal types of foreign engagement are more likely. This may hold true in India, too, at least during the earlier part of our

[17] In an unreported robustness test, we replaced the dummy variable on BITs by a dummy variable on double taxation treaties (DTTs). It turned out that DTTs were as effective as BITs in raising the number of all types of projects. Furthermore, the impact of DTTs was also stronger on JVs than on technical cooperation.

[18] However, the difference in the impact of BITs is not significant at conventional levels in the basic specification for majority JVs in column (5) of Table 2.

[19] The major exception concerns *Relative Political Risk,* for which the difference between minority JVs and technical cooperation is not significant at conventional levels.

period of observation, especially when one considers that the international outsourcing and offshoring of services is a relatively recent phenomenon. Table 3 presents the results for the basic specification of our estimation equations, with an overall number of about 12,700 projects in manufacturing (columns 1-4) and 8,000 in services (columns 5-8).[20]

Table 3 reveals that our explanatory variables are relevant in both sectors. The marginal effects are statistically significant at the ten percent level or higher, with very few exceptions. Furthermore, the impact of all variables works in the same direction for the number of projects in manufacturing and services. All the same, the p-values point to striking differences between the two sectors when comparing the impact of a particular variable on FDI projects, with the impact of the same variable on technical cooperation.

Several of the variables supposed to capture important elements of the bargaining position of foreign investors vis-à-vis the authorities in India appear to affect the composition of projects in the services sector only. In the services sector, the relative size of the country of origin, its financial market development, and its endowment of human capital affect all three types of FDI projects more strongly than technical cooperation. In the manufacturing sector, the impact of these variables on any type of FDI project does not differ significantly from their impact on technical cooperation. This striking contrast between the two sectors may be partly explained by the dominance of cost motives in manufacturing, and market motives in services. For instance, the bargaining position of foreign investors tends to improve with increasing *Relative GDP* in the case of local-market-oriented projects in services. The bargaining position is unlikely to be affected by *Relative GDP* in the case of manufacturing projects primarily drawing on cheap Indian labor. Consequently, the type of local-market-oriented projects carried out in services is more likely to be in line with the preferences of foreign investors.

Another part of the explanation for the contrasting findings in Table 3 could be the higher concentration of projects in services in recent years. The ratio of projects in services to those in manufacturing increased markedly from 0.23 in the first sub-period (1991-1995), to 1.46 in the last sub-period (2001-2004). Even though we control for time fixed effects, this shift implies that projects in services benefited over-proportionally from the process of FDI liberalization in India and the increasingly wide range of options of foreign ownership. This could also explain why risk-related factors, *Relative Political Risk* and *Bilateral Investment Treaties*, have a significantly stronger impact on FDI projects than on technical cooperation in the services sector, but generally not in the manufacturing sector.

[20] The results for the extended specification are not shown for the sake of brevity; they are available on request.

Differences between types of FDI

In the following, we exclude all technical cooperation projects from the estimations and focus on identifying differences across the three types of FDI related to the impact of our explanatory variables.[21] Table 4 presents the results for the FDI projects in both sectors combined, whereas Appendix E separates FDI projects in manufacturing from those in services.

The p-values reported in columns (5) and (6) of Table 4 largely support our hypotheses derived from the bargaining framework in Section 2. Several variables capturing country-of-origin characteristics that could have improved the bargaining position of foreign investors vis-à-vis the authorities in India, exert a significantly stronger impact on the number of wholly-owned subsidiaries than on the number of majority JVs. This holds for international experience (proxied by *FDI outward stock/ GDP*), relative market size (*Relative GDP*), relative financial market development (*Relative Domestic Credit*), and relative endowment of human capital (*Relative Schooling,* though only in the basic specification in column 5). A ratified BIT tends to shift the composition of FDI towards wholly-owned subsidiaries, at the expense of majority JVs. In addition, *Relative Political Risk* affects the number of wholly-owned subsidiaries more strongly than the number of majority JVs. The implication is similar to the finding in Table 2 above: Foreign investors tend to avoid wholly-owned subsidiaries because of the potentially large sunk costs under conditions of higher risk in India. Finally, the stronger negative effect of the exchange-rate variable suggests that uncertainty about currency developments and the option of waiting affect wholly-owned subsidiaries first and foremost.

Exchange-rate effects are not significantly different between majority and minority JVs, as can be seen from the p-values in columns (1) and (2) of Table 4. Likewise, the impact of political risk is similarly strong for both types of JVs. However, the remaining variables typically have a significantly stronger impact on the number of minority JVs, a result similar to the comparison between wholly-owned subsidiaries and majority JVs. This appears to be in conflict with the pattern which would be expected from the bargaining framework. The gradual liberalization of FDI regulations in the 1990s provides a possible explanation. Minority JVs often remained the only alternative to technical cooperation in the immediate aftermath of the 1991 reform program, when many restrictions on foreign majority ownership were still in place. Hence, the strong impact of various variables on minority JVs may be a "legacy" of the preferences of investors for minority JVs over technical cooperation before a wider range of options became available.

[21] We performed two sets of estimations with pooled FDI projects by setting either minority JVs or majority JVs as the base category. Obviously, this choice does not affect the impact of the explanatory variables on the number of any particular type of projects. However, the interpretation of the p-values is more intuitive when setting majority JVs as the base category (see below). The p-values with minority JVs as the base category are available on request.

This explanation is consistent with the findings in columns (3) and (4) of Table 2. However, the concentration of projects on wholly-owned subsidiaries *and* minority JVs shown for the last sub-period (2000-2004) in Figure 1 above, suggests that constrained choices have remained an issue in the more recent past. This is indeed the case in important segments of the services sector. FDI in trading activities represents the most prominent example: Wholly-owned subsidiaries are allowed in wholesale trade, whereas foreign ownership limits persist in so-called single-brand retailing and FDI is still prohibited in multi-brand retailing.[22] This helps explain the sector-specific estimation results for projects in the services sector. As shown earlier in Table 3, the impact of our explanatory variables tended to be significantly stronger on the number of FDI projects in services with technical cooperation as the base category. At the same time, the results for the services sector in Appendix E show a significantly stronger impact of essentially all the explanatory variables on both the number of wholly-owned subsidiaries, and minority JVs when considering majority JVs as the base category (and omitting technical cooperation projects). Once it is taken into account that foreign investors are still constrained in their ownership choices in important segments of the services sector, this pattern fits in with the bargaining framework.

5. Conclusion

India's opening-up to world markets in the early 1990s has widely been credited as a major pull factor of booming FDI. At the same time, the comprehensive overhaul of traditional restrictions and regulations has offered foreign investors more options in their type of engagement in India. This may have improved the bargaining position of foreign investors, notably those based in countries operating at the technological frontier, vis-à-vis the Indian authorities. Foreign investors tend to prefer full ownership control in order to prevent leakage and protect intellectual property, while India is particularly interested in spillovers from technical cooperation and joint ventures with local partners.

The interplay between country-of-origin characteristics and host-country characteristics has only received limited attention in the previous literature on the determinants of FDI, even though the ownership decisions by foreign investors are relevant to the macroeconomic benefits that host-countries can reap. We have made use of a unique dataset on about 24,500 approved cases of technical cooperation and FDI in India during the 1991-2004 period, in order to assess the impact of these country characteristics on the number of projects carried out by investors from 45 countries of origin. The dataset allowed us to distinguish between purely technical cooperation and FDI with

[22] For details, see: http://www.legalindia.in/foreign-direct-investment-in-indian-retail-sector-%E2%80%93-an-analysis (accessed: June 2011).

different degrees of foreign ownership. We performed negative binominal regressions and tested for different effects of our explanatory variables on specific types of projects.

Various variables derived from a bargaining framework prove to be relevant in shaping the decisions on technical cooperation versus equity engagements, and on the degree of foreign ownership in FDI projects. Market size, the sophistication of financial markets, and human capital endowment – all defined for the country of origin relative to India – are associated with more projects of all types. The same applies to the country of origin's international experience, its general level of economic development, and the protection of foreign investors through bilateral investment treaties.

This does not imply however, that the impact of our explanatory variables is the same across different types of projects. In fact, the impact on the number of technical cooperation agreements tends to be significantly weaker than that on the number of FDI projects. In particular, we find that foreign investors from larger and richer countries of origin with more sophisticated financial markets are in a better position to make the Indian authorities agree to wholly-owned subsidiaries. On the other hand, our results also suggest that foreign investors avoid the potentially large sunk costs of wholly-owned subsidiaries under conditions of relatively high political risk in India. In contrast to the traditional view on exchange rate-related wealth effects, we find stronger currencies of the countries of origin to be associated with fewer FDI projects – probably because large and sudden currency fluctuations lead to considerable uncertainty.

The differences between the impacts of country-of-origin characteristics on specific types of FDI are less clear. The bargaining framework is supported insofar as the impact of almost all characteristics proves to be stronger on wholly-owned subsidiaries than on majority JVs. However, the impact of several characteristics is also stronger on minority JVs than on majority JVs. We suspect that this is partly because foreign investors preferred minority JVs in the immediate aftermath of the reform program of 1991, as they were the only real alternative to technical cooperation at the time. However, constrained choices have remained an issue in the more recent past, notably for projects in important segments of the services sector. Future research may address this issue by refining the industry classification of FDI projects, and by re-assessing the interplay between country-of-origin and host-country characteristics once ownership restrictions have been relaxed in industries which are still regulated, such as retail trade.

References

Ai, C.C., and E-C. Norton (2003). Interaction Terms in Logit and Probit Models. *Economics Letters* 80 (1): 123-129.

Aliber, R. (1970). A Theory of Direct Foreign Investment. In: C. Kindleberger (ed.), *The International Corporation*. Cambridge, MA (MIT Press).

Anderson, E., and H. Gatignon (1988). The Multinational Corporation's Degree of Control over Foreign Subsidiaries: An Empirical Test of a Transaction Cost Explanation. *Journal of Law, Economics and Organization* 4 (2): 305-336.

Asiedu, E., and H.S. Esfahani (2001). Ownership Structure in Foreign Direct Investment Projects. *Review of Economics and Statistics* 83 (4): 647-662.

Balasubramanyam, V.N., and V. Mahambare (2003). FDI in India. *Transnational Corporations* 12 (2): 45-72.

Barro, R. and J.-W. Lee (2010). A New Data Set of Educational Attainment in the World, 1950-2010, NBER Working Paper No. 15902: Massachusetts. http://www.cid.harvard.edu/ ciddata/ ciddata.html (accessed: June 2011).

Blonigen, B.A. (1997). Firm-specific Assets and the Link between Exchange Rates and Foreign Direct Investment. *American Economic Review* 87 (3): 447-465.

Busse, M., C. Hefeker and S. Nelgen (2010). Foreign Direct Investment and Exchange Rate Regimes. Hamburg Institute of International Economics, HWWI Research Paper 2-17. Hamburg.

Brito, J.B. de, and F. de Mello Sampayo (2005). The Timing and Probability of FDI: An Application to US Multinational Enterprises. *Applied Economics* 37 (4): 417-437.

Campa, J.M. (1993). Entry by Foreign Firms in the US under Exchange Rate Uncertainty. *Review of Economics and Statistics* 75 (4): 614-622.

Cushman, D.O. (1985). Real Exchange Rate Risk, Expectations, and the Level of Direct Investment. *Review of Economics and Statistics* 67 (2): 297-308.

Choi, Y.J. (2007). The Determinants of Foreign Direct Investment in India. *International Studies Review* 8 (2): 79-90.

Deichmann, J.I. (2004). Origins of Foreign Direct Investment in Poland, 1989-2001. *Journal of Business and Economic Studies* 10 (1): 12-28.

Desai, M.A., F. Foley and J.R. Hines (2004). The Costs of Shared Ownership: Evidence from International Joint Ventures. *Journal of Financial Economics* 73 (2): 323-374.

Dunning, J.H. (1979). Explaining Changing Patterns of International Production: In Defence of the Eclectic Theory. *Oxford Bulletin of Economics and Statistics* 41 (4): 269-295.

Economic Research Service. (2011). International Macroeconomic Data Set, accessed online on 20th November 2010, Washington D.C. http://www.ers.usda.gov/Data/Macroeconomics/ (accessed: June 2011).

Egger, H., P. Egger and M. Ryan (2005). Exchange Rate Effects on Complex FDI: Theory and Evidence. http://www.socialpolitik.de/tagungshps/2005/Papers/Egger_h.pdf (accessed: June 2011).

Froot, K., and J. Stein (1991). Exchange Rates and FDI: An Imperfect Capital Markets Approach. *Quarterly Journal of Economics* 106 (4): 191-217.

Görg, H., and K. Wakelin (2002). The Impact of Exchange Rate Volatility on US Direct Investment. *Manchester School* 70 (3): 380-397.

Görg.H., H. Mühlen and P. Nunnenkamp (2010). FDI Liberalisation, Firm Heterogeneity and Foreign Ownership: German Firm Decisions in Reforming India. *Journal of Development Studies* 46 (8): 1367-1384.

Government of India (various issues). *Handbook of Industrial Policy and Statistics*. New Delhi (Ministry of Commerce and Industry, Department of Industrial Policy and Promotion).

Greene, W. (2010). Testing Hypotheses about Interaction Terms in Nonlinear Models. *Economics Letters* 107: 291-96.

Grosse, R., and L.J. Trevino (1996). Foreign Direct Investment in the United States: An Analysis by Country of Origin. *Journal of International Business Studies* 27 (1): 139-155.

Harzing, A.-W., and A. Sorge (2003). The Relative Impact of Country of Origin and Universal Contingencies on Internationalization Strategies and Corporate Control in Multinational Enterprises: Worldwide and European Perspectives. *Organization Studies* 24 (2): 187-214.

Henisz, W. J. (2002). The Institutional Environment for Infrastructure Investment. *Industrial and Corporate Change* 11 (2): 355-389. http://www-management.wharton.upenn.edu/henisz/ (accessed: June 2011).

IMF (2009). International Financial Statistics Indicators, Washington, DC.

Javorcik, B.K., and M. Spatareanu (2008). To Share or Not to Share: Does Local Participation Matter for Spillovers from Foreign Direct Investment? *Journal of Development Economics* 85 (2): 194-217.

Joshi, S., and R.V. Dadibhavi (2008). An Analysis of the Regional Distribution of Foreign Direct Investment (FDI) in India during Post-Liberalisation (1991-2003). *Indian Economic Journal* 55 (4): 116-132.

Kimino, S., D.S. Saal and N. Driffield (2007). Macro Determinants of FDI Inflows to Japan: An Analysis of Source Country Characteristics. *World Economy* 30 (3): 446-469.

Kobrin, S.J. (1980). Foreign Enterprise and Forced Divestment in LDCs. *International Organization* 34 (1): 65-88.

Kumar, N. (2006). Liberalization, FDI Flows, and Economic Development: The Indian Experiment in the 1990s. In: S. Urata, C.S. Yue and F. Kimura (eds.), *Multinationals and Economic Growth in East Asia.* London (Routledge): 453-487.

Liu, X., H. Song, Y. Wei and P. Romilly (1997). Country Characteristics and Foreign Direct Investment in China: A Panel Data Analysis. *Review of World Economics* 133 (2): 313-329.

Nunnenkamp, P., and R. Stracke (2008). Foreign Direct Investment in Post-reform India: Likely to Work Wonders for Regional Development? *Journal of Economic Development* 33 (2): 55-84.

Pain, N., and D. van Welsum (2003). Untying the Gordian Knot: The Multiple Links between Exchange Rates and Foreign Direct Investment. *Journal of Common Market Studies* 41 (5): 823-846.

Palit, A., and S. Nawani (2007). Technological Capability as a Determinant of FDI Inflows: Evidence from Developing Countries and India. ICRIER Working Paper 193. New Delhi (Indian Council for Research on International Economic Relations).

Pan, Y. (1994). Entering China through Equity Joint Ventures: A Comparison of Japanese, U.S., European, and Hong Kong Approaches. *Journal of Asian Business* 10 (2): 97-108.

Pan, Y. (2002). Equity Ownership in International Joint Ventures: The Impact of Source Country Factors. *Journal of International Business Studies* 33 (2): 375-384.

Pan, Y. (2003). The Inflow of Foreign Direct Investment to China: The Impact of Country-specific Factors. *Journal of Business Research* 56 (10): 829-833.

Pan, Y., and D.K. Tse (2000). The Hierarchical Model of Market Entry Modes. *Journal of International Business Studies* 31 (4): 535-554.

Pauly, L.W., and S. Reich (1997). National Structures and Multinational Corporate Behavior: Enduring Differences in the Age of Globalization. *International Organization* 51 (1): 1-30.

Roberts, B., and A. Almahmood (2009). Source Country Characteristics and the Inflow of Foreign Direct Investment into Saudi Arabia. *World Economy* 32 (12): 1730-1746.

Sauvant, K.P., and L.E. Sachs (eds.) (2009). *The Effect of Treaties on Foreign Direct Investment: Bilateral Investment Treaties, Double Taxation Treaties, and investment Flows.* Oxford (Oxford University Press).

Scaperlanda, A.E., and L.J. Mauer (1969). The Determinants of US Direct Investment in the EEC. *American Economic Review* 59 (4): 558-568.

Schmidt, C.W., and U. Broll (2009). Real Exchange-Rate Uncertainty and US Foreign Direct Investment: An Empirical Analysis. *Review of World Economics* 145 (3): 513-530.

Singh, K. (2005). Foreign Direct Investment in India: A Critical Analysis of FDI from 1991-2005. New Delhi (Centre for Civil Society).http://129.3.20.41/eps/dev/papers/0511/ 0511013.pdf (accessed: June 2010).

Sury, N. (2008). Determinants of Foreign Direct Investment in India. *Foreign Trade Review* 42 (4): 24-41.

Svejnar, J., and S.C. Smith (1984). The Economics of Joint Ventures in Less Developed Countries. *Quarterly Journal of Economics* 99 (1): 149-167.

Tallman, S.B. (1988). Home Country Political Risk and Foreign Direct Investment in the United States. *Journal of International Business Studies* 19 (2): 219-234.

Thomas, D.E., and R. Grosse (2001). Country-of-origin Determinants of Foreign Direct Investment in an Emerging Market: The Case of Mexico. *Journal of International Management* 7 (1): 59-79.

Tobin, J.L., and S. Rose-Ackerman (2011). When Bits Have Some Bite: The Political-economic Environment for Bilateral Investment Treaties. *Review of International Organizations* 6 (1): 1-32.

UNCTAD (2010a). *World Investment Report 2010.* Geneva and New York (United Nations).

UNCTAD (2010b). United Nations Conference on Trade and Development Country-specific Lists of BITs and BDTTs, Geneva. http://www.unctad.org/Templates/Page.asp?intItemID=2344&lang=1 (accessed: November 2010).

UNCTAD (2010c). United Nations Conference on Trade and Development Statistics Overview, Geneva. http://www.unctad.org/Templates/Page.asp?intItemID=1584&lang=1 (accessed: November 2010).

World Bank (2010), World Development Indicators, Washington, DC.

Zhao, H. (2003). Country Factor Differentials as Determinants of FDI Flow to China. *Thunderbird International Business Review* 45 (2): 149-169.

Table 1: Relative importance of technical cooperation and FDI projects, four major countries of origin (percent of all projects in 1991-2004)

Type of project	Germany	Japan	United Kingdom	United States
Technical cooperation	41.7	50.6	33.5	27.3
Minority JVs	22.4	27.8	26.1	27.8
Majority JVs	21.5	13.6	19.4	15.6
Wholly-owned subsidiaries	14.3	8	21.1	29.3
All projects (number)	2606	1635	2560	6100

Table 2: All projects, 1991-2004, negative binomial regressions

	(1) TC	(2) TC	(3) Minority JV	(4) Minority JV	(5) Majority JV	(6) Majority JV	(7) WOS	(8) WOS
FDI outward stock/GDP	0.011***	0.005***	0.075***	0.055***	0.030***	0.020***	0.061***	0.047***
	(3.74)	(3.09)	(5.07)	(4.88)	(4.17)	(3.94)	(4.85)	(4.63)
			[0.0000]	[0.0000]	[0.0115]	[0.0051]	[0.0001]	[0.0000]
Relative GDP	0.115***	0.077***	0.414***	0.350***	0.159***	0.126***	0.312***	0.280***
	(3.63)	(3.70)	(4.54)	(4.70)	(3.89)	(3.97)	(4.56)	(4.70)
			[0.0019]	[0.0004]	[0.3937]	[0.1928]	[0.0089]	[0.0013]
Relative Domestic Credit	0.154***	0.112***	0.686***	0.549***	0.266***	0.203***	0.549***	0.453***
	(3.37)	(3.33)	(3.78)	(3.64)	(3.35)	(3.17)	(3.50)	(3.34)
			[0.0044]	[0.0047]	[0.2198]	[0.2087]	[0.0156]	[0.0147]
Relative Political Risk	-0.060	-0.202**	-0.641	-0.888*	-0.428	-0.529**	-2.439***	-2.460***
	(0.56)	(2.02)	(1.15)	(1.75)	(1.63)	(2.20)	(3.18)	(3.47)
			[0.3050]	[0.1858]	[0.1951]	[0.2091]	[0.0021]	[0.0016]
Bilateral Investment Treaties	0.738***	0.570***	2.643***	2.355***	1.210***	1.020***	2.721***	2.450***
	(4.08)	(4.19)	(4.84)	(4.97)	(4.27)	(4.33)	(4.88)	(4.99)
			[0.0009]	[0.0003]	[0.1606]	[0.0983]	[0.0007]	[0.0002]
Real Exchange Rate Index	-0.102	0.036	-1.405***	-0.922**	-0.681***	-0.484***	-1.698***	-1.423***
	(1.25)	(0.58)	(2.86)	(2.29)	(2.88)	(2.60)	(3.32)	(3.22)
			[0.0089]	[0.0186]	[0.0205]	[0.0081]	[0.0020]	[0.0011]
Relative Schooling	0.376***	0.118*	1.201***	0.343	0.488***	0.080	1.286***	0.653*
	(3.24)	(1.81)	(3.02)	(1.07)	(2.66)	(0.59)	(3.01)	(1.79)
			[0.0467]	[0.4934]	[0.6068]	[0.8000]	[0.0400]	[0.1499]
Per capita GDP (log)		0.195***		0.678***		0.324***		0.471***
		(3.83)		(3.81)		(3.60)		(3.01)
				[0.0092]		[0.2132]		[0.0939]
Year 1991	1.210***	1.102***	0.666	0.817	-0.035	0.101	-8.659***	-7.802***
	(5.90)	(5.95)	(1.08)	(1.54)	(0.10)	(0.36)	(2.76)	(2.82)
Year 1992	1.486***	1.312***	1.800***	1.850***	1.321***	1.236***	-3.293***	-2.976***
	(5.67)	(5.77)	(4.14)	(4.86)	(6.81)	(7.07)	(2.66)	(2.70)
Year 1993	1.416***	1.203***	2.307***	2.232***	1.207***	1.133***	-2.251**	-2.055**
	(5.76)	(5.89)	(5.65)	(6.09)	(6.53)	(6.81)	(2.27)	(2.32)
Year 1994	1.439***	1.221***	2.626***	2.496***	1.366***	1.237***	-1.013	-0.902
	(5.71)	(5.85)	(6.56)	(6.92)	(7.01)	(7.15)	(1.40)	(1.40)
Year 1995	1.376***	1.165***	3.032***	2.847***	1.386***	1.246***	-0.629	-0.520
	(5.75)	(5.89)	(7.14)	(7.45)	(6.85)	(6.96)	(0.97)	(0.90)
Year 1996	1.170***	0.977***	1.710***	1.625***	1.650***	1.499***	0.518	0.493
	(6.03)	(6.18)	(4.00)	(4.26)	(7.02)	(7.12)	(1.14)	(1.21)
Year 1997	0.956***	0.836***	0.600	0.572	1.352***	1.255***	0.403	0.426
	(6.34)	(6.42)	(1.14)	(1.22)	(6.89)	(7.07)	(0.91)	(1.08)
Year 1998	0.890***	0.773***	-0.911	-0.757	0.656***	0.607***	0.308	0.335
	(6.40)	(6.51)	(1.21)	(1.15)	(3.59)	(3.89)	(0.68)	(0.83)
Year 1999	0.754***	0.674***	0.392	0.460	0.615***	0.597***	-0.123	-0.042
	(6.41)	(6.57)	(0.73)	(0.99)	(3.37)	(3.87)	(0.24)	(0.09)
Year 2000	0.714***	0.636***	-0.170	-0.041	0.379*	0.367**	-0.632	-0.539
	(6.30)	(6.49)	(0.27)	(0.08)	(1.76)	(2.02)	(1.07)	(1.04)
Year 2001	0.532***	0.488***	0.080	0.218	0.124	0.191	-0.208	-0.113
	(5.39)	(5.91)	(0.14)	(0.43)	(0.49)	(0.92)	(0.40)	(0.25)
Year 2002	0.426***	0.409***	0.343	0.357	0.095	0.151	0.047	0.132
	(4.36)	(5.18)	(0.63)	(0.75)	(0.37)	(0.72)	(0.10)	(0.31)
Year 2003	0.529***	0.464***	-0.012	0.050	-0.274	-0.210	0.081	0.122
	(5.41)	(5.78)	(0.02)	(0.10)	(0.83)	(0.76)	(0.17)	(0.29)
Total Observations	2520	2520	2520	2520	2520	2520	2520	2520
No. of Countries	45	45	45	45	45	45	45	45
Goodness of Fit test: chi2	16373***	13652***	16373***	13652***	16373***	13652***	16373***	13652***
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Reports marginal effects at the mean of the explanatory variables. Brackets report p-values for tests of equality between the marginal effects with respect to TC projects. t- statistics in parentheses; * (**, ***) indicates significance at the ten (five, one) percent level.

Table 3: Projects in manufacturing and services, 1991-2004, negative binomial regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Manufacturing				Services		
	TC	Minority JV	Majority JV	WOS	TC	Minority JV	Majority JV	WOS
FDI outward stock/GDP	0.008***	0.026***	0.012***	0.018***	0.003***	0.043***	0.013***	0.035***
	(3.35)	(4.31)	(3.53)	(4.14)	(2.64)	(5.34)	(4.13)	(5.07)
		[0.0060]	[0.3261]	[0.0484]		[0.0000]	[0.0016]	[0.0000]
Relative GDP	0.119***	0.187***	0.070***	0.099***	0.013**	0.188***	0.060***	0.174***
	(3.46)	(3.84)	(3.29)	(3.71)	(2.55)	(4.87)	(3.89)	(4.76)
		[0.2537]	[0.2242]	[0.6505]		[0.0000]	[0.0043]	[0.0000]
Relative Domestic Credit	0.134***	0.262***	0.118***	0.190***	0.014*	0.480***	0.121***	0.357***
	(3.12)	(3.23)	(2.94)	(3.04)	(1.88)	(4.30)	(3.34)	(3.80)
		[0.1640]	[0.7833]	[0.4605]		[0.0000]	[0.0040]	[0.0003]
Relative Political Risk	-0.018	-0.168	-0.081	-0.944***	-0.050	-1.435***	-0.513***	-2.054***
	(0.17)	(0.64)	(0.65)	(2.85)	(1.59)	(3.28)	(2.98)	(3.82)
		[0.5983]	[0.7050]	[0.0079]		[0.0016]	[0.0082]	[0.0002]
Bilateral Investment Treaties	0.707***	1.254***	0.616***	1.035***	0.084**	1.274***	0.464***	1.593***
	(3.90)	(4.28)	(3.69)	(4.18)	(2.49)	(4.81)	(3.96)	(4.98)
		[0.1124]	[0.7113]	[0.2856]		[0.0000]	[0.0018]	[0.0000]
Real Exchange Rate Index	-0.147*	-0.790***	-0.302**	-0.712***	-0.066**	-0.382	-0.273**	-0.782***
	(1.70)	(2.96)	(2.46)	(3.03)	(2.02)	(1.49)	(2.54)	(2.86)
		[0.0218]	[0.3023]	[0.0243]		[0.2196]	[0.0644]	[0.0093]
Relative Schooling	0.373***	0.594***	0.237**	0.461**	0.049**	0.677***	0.226**	0.975***
	(3.11)	(2.91)	(2.45)	(2.57)	(1.97)	(2.76)	(2.48)	(3.34)
		[0.3502]	[0.3795]	[0.6843]		[0.0109]	[0.0608]	[0.0016]
Total Observations	2520	2520	2520	2520	2520	2520	2520	2520
No. of Countries	45	45	45	45	45	45	45	45
Goodness of Fit test: chi2	11595***	11595***	11595***	11595***	5660***	5660***	5660***	5660***
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

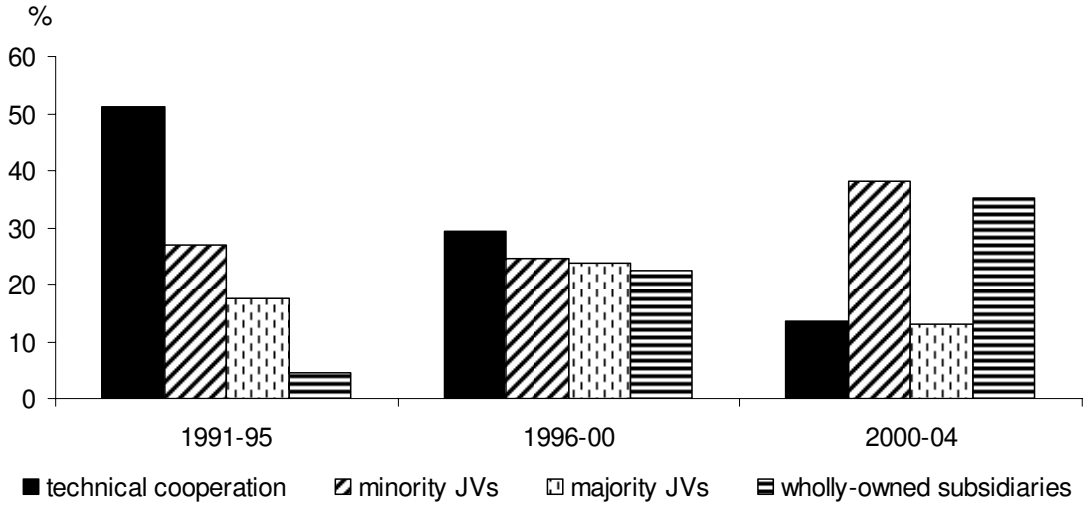
Notes: Reports marginal effects at the mean of the explanatory variables. Brackets report p-values for tests of equality between the marginal effects with respect to TC projects. t- statistics in parentheses; * (**, ***) indicates significance at the ten (five, one) percent level.

Table 4: FDI projects, 1991-2004, negative binomial regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	Minority JV	**Minority JV**	**Majority JV**	**Majority JV**	**WOS**	**WOS**
FDI outward stock/GDP	0.075***	0.054***	0.029***	0.019***	0.061***	0.046***
	(5.38)	(5.15)	(4.40)	(4.12)	(5.13)	(4.87)
	[0.0034]	[0.0023]			[0.0218]	[0.0100]
Relative GDP	0.414***	0.347***	0.155***	0.122***	0.312***	0.278***
	(4.82)	(4.98)	(4.10)	(4.17)	(4.83)	(4.96)
	[0.0058]	[0.0028]			[0.0361]	[0.0134]
Relative Domestic Credit	0.679***	0.540***	0.260***	0.196***	0.548***	0.450***
	(4.00)	(3.83)	(3.52)	(3.32)	(3.69)	(3.51)
	[0.0237]	[0.0243]			[0.0821]	[0.0717]
Relative Political Risk	-0.662	-0.926*	-0.445*	-0.544**	-2.511***	-2.528***
	(1.26)	(1.91)	(1.80)	(2.40)	(3.40)	(3.70)
	[0.7088]	[0.4748]			[0.0079]	[0.0059]
Bilateral Investment Treaties	2.649***	2.350***	1.195***	1.000***	2.726***	2.447***
	(5.12)	(5.24)	(4.49)	(4.54)	(5.16)	(5.26)
	[0.0125]	[0.0069]			[0.0097]	[0.0049]
Real Exchange Rate Index	-1.377***	-0.900**	-0.665***	-0.468***	-1.694***	-1.412***
	(2.98)	(2.37)	(3.01)	(2.70)	(3.50)	(3.37)
	[0.1647]	[0.2995]			[0.0534]	[0.0372]
Relative Schooling	1.195***	0.325	0.483***	0.077	1.308***	0.668*
	(3.18)	(1.07)	(2.80)	(0.61)	(3.19)	(1.91)
	[0.0853]	[0.4491]			[0.0636]	[0.1120]
Per capita GDP (log)		0.696***		0.326***		0.482***
		(4.07)		(3.83)		(3.22)
		[0.0533]				[0.3672]
Total Observations	1890	1890	1890	1890	1890	1890
No. of Countries	45	45	45	45	45	45
Goodness of Fit test: chi2	9985***	8595***	9985***	8596***	9985***	8596***
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Reports marginal effects at the mean of the explanatory variables. Brackets report p-values for tests of equality between the marginal effects with respect to majority JVs. t- statistics in parentheses; * (**, ***) indicates significance at the ten (five, one) percent level.

Figure 1: Changes in the Composition of Technical Cooperation and FDI Projects in India, 1991-2004 (percent of all projects; period average)



Source: DIPP database

Appendix A: Sample of countries of origin

Argentina, Australia, Austria, Bahrain, Bangladesh, Belgium, Brazil, Bulgaria, Canada, China, Cyprus, Denmark, Finland, France, Germany, Greece, Hungary, Indonesia, Iran, Ireland, Israel, Italy, Japan, Jordan, Kenya, Kuwait, Malaysia, Mexico, Netherlands, New Zealand, Norway, Philippines, Poland, Portugal, Republic of South Africa, Romania, Singapore, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Thailand, United Kingdom, United States.

Appendix B: Summary statistics

Variables	Mean	Standard Deviation	Minimum	Maximum	Observations
Per capita GDP (log)	8.97	1.30	5.57	10.59	630
FDI outward stock/GDP	14.70	19.35	-0.61	109.32	630
Relative Schooling	1.81	0.54	0.49	3.19	630
Relative GDP	1.48	3.69	0.02	25.77	630
Relative Domestic Credit	2.00	1.19	0.24	8.08	630
Relative Political Risk	0.60	0.27	0.00	1.69	630
Bilateral Investment Treaties	0.26	0.44	0.00	1.00	630
Real Exchange Rate Index	1.27	0.41	0.12	3.91	630
Wholly-owned subsidiaries, number	7.15	24.80	0	309	630
Majority JVs, number	6.33	14.40	0	115	630
Minority JVs, number	9.62	23.04	0	241	630
Technical Cooperation, number	11.69	26.33	0	210	630
Wholly-owned subsidiaries, number in manufacturing	2.27	5.48	0	51	630
Majority JVs, number in manufacturing	3.47	8.21	0	63	630
Minority JVs, number in manufacturing	4.86	9.54	0	66	630
Technical Cooperation, number in manufacturing	9.41	21.46	0	161	630
Wholly-owned subsidiaries, number in services	4.61	19.55	0	236	630
Majority JVs, number in services	2.52	6.55	0	59	630
Minority JVs, number in services	4.07	14.19	0	162	630
Technical Cooperation, number in services	1.29	3.94	0	41	630

Note: FDI outward stock/GDP takes a negative value for three observations (two in the case of Iran and one in the case of Bulgaria). This is because UNCTAD estimates some stocks by accumulating net outward flows, which may be negative. In unreported robustness tests, we set the three observations equal to zero. The results were not affected.

Appendix C: Description of variables and sources

Variables	Definition	Source
Technical cooperation and FDI projects	Number of approved projects: • technical cooperation (no foreign equity stake) • minority JVs (foreign equity stake of < 50%) • majority JVs (foreign equity stake of 50 – 90%) • wholly-owned subsidiaries (foreign equity stake of > 90%)	Ministry of Commerce and Industry, Department of Industrial Promotion and Policy (DIPP)
Per capita GDP (log)	Average GDP per head in the country of origin, US$ in constant prices of 2005; logged.	Economic Research Service (2011)
FDI outward stock/GDP	Outward FDI stock of the country of origin in percent of GDP.	UNCTAD (2010b)
Relative Schooling	Years of secondary schooling in the country of origin, relative to years of secondary schooling in India. The data were available in five-year intervals until 2000. The gaps between data points were interpolated and the data were extrapolated until 2004.	Barro and Lee (2010)
Relative GDP	GDP of the country of origin, relative to the GDP of India, US$ million, constant prices of 2000.	World Bank (2010)
Relative Domestic Credit	Total domestic credit provided by banks in the country of origin, in percent of GDP, relative to domestic credit in percent of GDP in India.	World Bank (2010)
Relative Political Risk	Political Constraints Index III, coded on a scale of 0 – 1, with higher values reflecting stricter constraints on the executive branch of the state.	Henisz (2002)
Bilateral Investment Treaties	Dummy value, set equal to 1 if a country of origin ratified a bilateral investment treaty with India, and 0 otherwise.	UNCTAD (2010c)
Real Exchange Rate Index	Real exchange rate index (1990=1), Indian Rupees per unit of country-of-origin currency. Nominal exchange rates were adjusted for by consumer price indexes.	IMF (2009)

Appendix D – Overview of selected studies on country-of-origin characteristics

Study	Dependent variable	Major determinants (+/- if significantly positive/negative; ? if insignificant or ambiguous)	Host country	Method
Grosse and Trevino (1996)	(a) FDI flows and (b) foreign affiliate sales from 23 source countries in 1980-1991	Source country size(+); per-capita GDP of source country(?); source country exports to US(+) and imports from US(-); source country political risk(?); source country currency/US$(-); relative cost of borrowing(?); distance(-?); note: signs in parentheses relate to estimations for (a) FDI flows; estimations for (b) differ in some respects	United States	Pooled time-series, cross-section regression
Thomas and Grosse (2001)	Annual FDI flows from 11 source countries in 1980-1995	Source country size(?); bilateral trade(+); source country political risk(?); source country currency/peso(?); cost of borrowing in source country(-); wage costs in source country(?); distance(+?)	Mexico	Pooled time-series, cross-section GLS regression
Kimino et al. (2007)	Annual FDI flows from 17 source countries in 1989-2002	Source country size(?); source country export(-); exchange rate (appreciation of source country currency(?); relative borrowing costs(+?); relative labor costs(?); source country credit rating(+)	Japan	Fixed effects panel regressions
Deichmann (2004)	# firms with FDI from 34 source countries (total of 906 firms)	GDP(+); EU membership(+); Polish diaspora in source country(+); bilateral trade(+); distance(-)	Poland	OLS
Roberts and Almahmood (2009)	(a) FDI flows and (b) # FDI projects from 33 source countries in 1980-2005	Differs between (a) and (b); for (b): source country size(+); distance measures(-); economic freedom(+); bilateral trade(?)	Saudi Arabia	Tobit; Heckman; negative binominal regression
Liu et al. (1997)	Contracted (realized) FDI flows from 22 (17) source countries in 1983-94 (1984-94)	Ratio host/source wages(-); ratio host/source GDP(+?); RMB/source country currency(+); bilateral trade(+); ratio host/source cost of borrowing(?); ratio host/ source risk(?); distance(?)	China	Panel, random-effects GLS regressions
Pan and Tse (2000)	Entry mode (equity vs. non-equity; wholly owned subsidiary vs. JV) of >10,000 entry decisions by foreign firms in 1979-98	Host country risk(+/+); risk aversion of source-country management(-/?); degree of inequality and hierarchical distance in source country(+/?); bilateral trade(+/?); diplomatic ties(-/?); note: the authors stress that these factors have an important say in the decision on equity vs. non-equity entry (first entry in brackets), but are hardly relevant for deciding on WOS vs. JV (second entry in brackets); the direction of effects is not always clear due to ambiguity in the specification of variables	China	Binary and ordered logistic regression
Pan (2002)	Foreign equity share in 8078 JVs from six source countries in 1979-1996	Exports of source country to China(+?); cost of borrowing in source country(-); RMB/source country currency(+); risk aversion of source-country management(+)	China	Ordered logistic regression; Tobit
Pan (2003)	Annual FDI inflows from 30 source countries in 1984-1996	Source country GDP(-); source country's total trade and bilateral trade with China(+); cost of borrowing in source country(-?); RMB/source country currency(?); risk aversion of source-country management(-?); risk in China(+); distance(?)	China	Pooled OLS
Zhao (2003)	Annual FDI flows from 21 source countries in 1983-1999	Source-host difference in GDP(+); source-host growth difference(?); export market share in China(+); source-host difference in cost of borrowing(-); RMB/source country currency(+); source-host difference in political(+) and operating(?) risk	China	Pooled cross-country, time series regression

Appendix E: FDI projects in manufacturing and services, 1991-2004, negative binomial regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	Manufacturing Projects			Services Projects		
	Minority JV	Majority JV	WOS	Minority JV	Majority JV	WOS
FDI outward stock/GDP	0.026***	0.012***	0.018***	0.043***	0.013***	0.035***
	(4.54)	(3.69)	(4.34)	(5.42)	(4.18)	(5.14)
	[0.0338]		[0.2587]	[0.0003]		[0.0025]
Relative GDP	0.186***	0.068***	0.099***	0.188***	0.060***	0.174***
	(4.06)	(3.45)	(3.90)	(4.94)	(3.93)	(4.83)
	[0.0181]		[0.3295]	[0.0018]		[0.0036]
Relative Domestic Credit	0.262***	0.116***	0.193***	0.480***	0.121***	0.356***
	(3.41)	(3.08)	(3.19)	(4.36)	(3.38)	(3.85)
	[0.0885]		[0.2837]	[0.0019]		[0.0177]
Relative Political Risk	-0.174	-0.090	-0.981***	-1.459***	-0.518***	-2.071***
	(0.69)	(0.76)	(3.02)	(3.34)	(3.03)	(3.89)
	[0.7622]		[0.0100]	[0.0443]		[0.0055]
Bilateral Investment Treaties	1.264***	0.610***	1.046***	1.277***	0.464***	1.595***
	(4.50)	(3.85)	(4.38)	(4.88)	(4.01)	(5.05)
	[0.0426]		[0.1287]	[0.0045]		[0.0008]
Real Exchange Rate Index	-0.784***	-0.301**	-0.718***	-0.382	-0.272**	-0.780***
	(3.08)	(2.58)	(3.16)	(1.51)	(2.57)	(2.89)
	[0.0842]		[0.1024]	[0.6895]		[0.0796]
Relative Schooling	0.590***	0.234**	0.470***	0.682***	0.226**	0.980***
	(3.04)	(2.55)	(2.69)	(2.80)	(2.51)	(3.38)
	[0.0976]		[0.2328]	[0.0792]		[0.0129]
Total Observations	1890	1890	1890	1890	1890	1890
No. of Countries	45	45	45	45	45	45
Goodness of Fit test: chi2	5986***	5986***	5986***	4733***	4732***	4733***
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Reports marginal effects at the mean of the explanatory variables. Brackets report p-values for tests of equality between the marginal effects with respect to majority JVs. t- statistics in parentheses; * (**, ***) indicates significance at the ten (five, one) percent level.